Electronic Version

Stylesheet Version v1.1.1

Claims

[c1] 1. A method for predicting life-affecting damage on a rotary member to be subjected to repeated loading during operation, said method comprising:

measuring a number of operating parameters and calculating a temperature increase during each loading based on said operating parameters;

calculating a total temperature in a part of the rotary member for each loading by summation of a basic temperature of the rotary member before the loading concerned and said temperature increase;

utilizing the values for the total temperature as a measure of said damage and wherein that part of the rotary member for which the total temperature is calculated defines a surface acted on when the rotary member is loaded and two sets of predetermined functions (K, L; M, N), each comprising at least one function, are used for temperature-increase calculation; and

utilizing the sets used for temperature-increase calculation and making a selection depending on at least the nature of the rotary member.

[c2] 2. A method for predicting life-affecting damage on a

rotary member subjected to repeated loading during operation, a number of measured operating parameters being received and a temperature increase during each loading being calculated from said operating parameters, a total temperature in a part of the rotary member being calculated for each loading by summation of a basic temperature of the rotary member before the loading of concern, and said temperature increase, and the values for the total temperature being used as a measure of said damage, the part of the rotary member for which the total temperature is calculated defines a surface which is acted on when the rotary member is loaded, in that two-sets of predetermined functions (K, L; M, N), which each comprise at least one function, are used for temperature-increase calculation, and in that the set which is used for temperature-increase calculation is selected depending on at least the nature of the rotary member.

[c3] 3. The method as recited in claim 1, wherein the time for which the rotary member (2) is applied is measured, and in the set of functions (K, L; M, N) which is used for each specific temperature-increase calculation is also selected depending on this time.

[c4] 4. The method as recited in claim 2, wherein the time for which the rotary member (2) is applied is measured, and

in the set of functions (K, L; M, N) which is used for each specific temperature-increase calculation is also selected depending on this time.

[c5] 5. The method as recited in claim 3, wherein a constant (Fo) is calculated after every loading on the basis of both the nature of the rotary member and the loading time, in that when a calculated value of the constant lies below a predetermined limit value, a first set of functions is used, and in that when a calculated value lies above said limit value, a second set of functions is used.

[c6] 6. The method as recited in claim 4, wherein a constant (Fo) is calculated after every loading on the basis of both the nature of the rotary member and the loading time, in that when a calculated value of the constant lies below a predetermined limit value, a first set of functions is used, and in that when a calculated value lies above said limit value, a second set of functions is used.

[c7] 7. The method as recited in claim 1, wherein the specific function (M1, M2; N1, N2) which is to be used for temperature-increase calculation is selected from a specifically selected set of functions depending on loading type.

[c8] 8. The method as recited in claim 2, wherein the specific

function (M1, M2; N1, N2) which is to be used for temperature-increase calculation is selected from a specifically selected set of functions depending on loading type.

[c9] 9. The method as recited in claim 1, wherein each of said sets comprises only one function (K, L), which is thus selected irrespective of loading type.

[c10] 10. The method as recited in claim 2, wherein each of said sets comprises only one function (K, L), which is thus selected irrespective of loading type.

[c11] 11. The method as recited in claim 1, wherein each of the graphs of said functions has such a shape that a logarithmic first expression for the temperature increase changes linearly as a function of a logarithmic second expression for the nature of the rotary member.

[c12] 12. The method as recited in claim 2, wherein each of the graphs of said functions has such a shape that a logarithmic first expression for the temperature increase changes linearly as a function of a logarithmic second expression for the nature of the rotary member.

[c13] 13. The method as recited in claim 12, wherein said second expression is calculated as a power function of a result of the duration in time of the loading divided by a

value for the nature of the rotary member.

[c14] 14. The method as recited in claim 11, wherein said second expression is calculated as a power function of a result of the duration in time of the loading divided by a value for the nature of the rotary member.

[c15] 15. The method as recited in claim 1, wherein the total temperature value produced, or a converted damage value, for each loading instance is stored in a position in a memory, which position defines a specific temperature range or damage range.

[c16] 16. The method as recited in claim 15, wherein the damage or consumed life is calculated on the basis of the number of times each specific range has been reached and knowledge of the damage durability of, the rotary member.

[c17] 17. The method as recited in claim 16, wherein the damage or the consumed life is calculated with a part damage theory.

[c18] 18. The method as recited in claim 11, wherein the relationship between the total temperature and the number of loading cycles is described as a power function.

[c19] 19. The method as recited in claim 1, wherein the time

between two successive loadings is determined, and a new basic temperature for the later loading is determined.

[c20] 20. The method as recited in claim 19, wherein for a large number of successive loadings, the new basic temperature for a later loading is calculated with the aid of an expression for a cooling process of the rotary member after a preceding loading has ended.

[c21] 21. The method as recited in claim 20, wherein over a relatively long time interval between two loadings, a temperature on the rotary member is measured, and this temperature value is then used as a new basic temperature for a subsequent loading.

[c22] 22. The method as recited in claim 1, wherein the measured operating parameters comprise pressure applied to the rotary member, rotational speed of the rotary member and also the time for which the rotary member is applied.

[c23] 23. The method as recited in claim 1, wherein the rotary member is disk-shaped.

[c24] 24. The method as recited in claim 1, wherein the rotary member consists of a disk in a clutch or brake.

[c25] 25. The method as recited in claim 1, wherein the rotary member consists of a gearwheel in a gear train.

[c26] 26. The method as recited in claim 1, wherein the rotary member consists of a component of a vehicle.

[c27] 27. A computer program product including program segments that when run on a computer, perform steps comprising predicting life-affecting damage on a rotary member subjected to repeated loading during operation, a number of measured operating parameters being received and a temperature increase during each loading being calculated from said operating parameters, a total temperature in a part of the rotary member being calculated for each loading by summation of a basic temperature of the rotary member before the loading of concern, and said temperature increase, and the values for the total temperature being used as a measure of said damage, the part of the rotary member for which the total temperature is calculated defines a surface which is acted on when the rotary member is loaded, in that two-sets of predetermined functions (K, L; M, N), which each comprise at least one function, are used for temperature-increase calculation, and in that the set which is used for temperature-increase calculation is selected depending on at least the nature of the rotary member.

[c28] 28. A computer program product comprising computer program segments stored on a computer-readable means for performing a method, when the program is run on a computer comprising: predicting life-affecting damage on a rotary member subjected to repeated loading during operation, a number of measured operating parameters being received and a temperature increase during each loading being calculated from said operating parameters, a total temperature in a part of the rotary member being calculated for each loading by summation of a basic temperature of the rotary member before the loading of concern, and said temperature increase, and the values for the total temperature being used as a measure of said damage, the part of the rotary member for which the total temperature is calculated defines a surface which is acted on when the rotary member is loaded, in that two-sets of predetermined functions (K, L; M, N), which each comprise at least one function, are used for temperature-increase calculation, and in that the set which is used for temperature-increase calculation is selected depending on at least the nature of the rotary member.